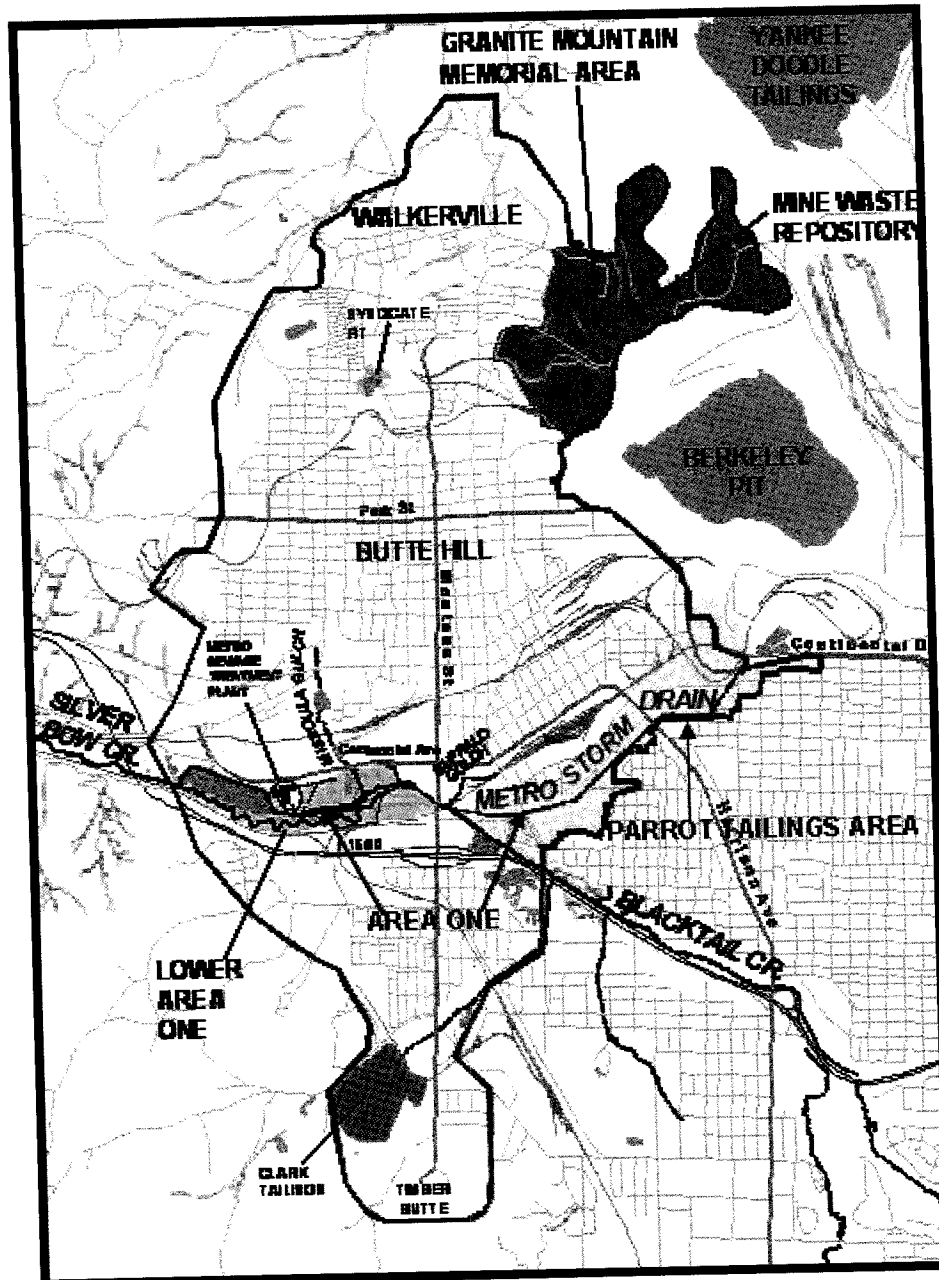


## **Appendix D**

# **Butte Area One Restoration Planning Process and Draft Conceptual Restoration Plan     State of Montana Natural Resource Damage Program**



November 2007

DRAFT

STATE OF MONTANA'S  
CONCEPTUAL RESTORATION PLAN and PROPOSED PLANNING  
PROCESS FOR BUTTE AREA ONE  
GROUNDWATER AND SURFACE WATER RESOURCES

Prepared by  
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## Section 1: Introduction

Natural resource damages under the Comprehensive Environmental Response, Compensation and Liability Act, 42 U. S. C. ~ 9601 *et seq.*, (CERCLA) are designed to compensate trustees<sup>1</sup> for injury<sup>2</sup> to natural resources<sup>3</sup> that are residual to CERCLA response actions.<sup>4</sup> In 1983, the State of Montana filed a lawsuit in federal court against the Atlantic Richfield Company (ARCO) for natural resource damages that have arisen as a result of ARCO's and its predecessors' mining and smelting operations in the Upper Clark Fork River Basin (UCFRB), particularly around Butte and Anaconda. In 1995, as a part of that litigation, the State issued a Restoration Determination Plan (RDP). Based on information then available about the projected EPA response actions to be undertaken at UCFRB site, the RDP quantified natural resource damages to which the State was entitled in order to restore the injured natural resources at the UCFRB. Among other resources, the RDP identified Butte Area One groundwater and surface water resources as needing restoration (see Figure 1).<sup>5</sup>

In 1999, the federal court approved a partial settlement of the Montana v. ARCO lawsuit. That settlement, however, did not resolve the State's restoration damages claims for the "Step 2 Sites." One of these Step 2 sites is the Butte Area One Groundwater and Surface Water Resources. The State, the United States, and ARCO recently lodged additional consent decrees with federal district court, which, among other things, would settle the State's outstanding restoration damages claim for the Step 2 Sites. Upon the effective date of these consent decrees, ARCO has agreed to pay \$72.5 million plus interest, to resolve the State's natural resource damage claims for the Step 2 Sites. The consent decree allocates 41.25% of the settlement money, after payment of assessment and litigation costs, i.e. approximately \$28 million, to the Butte Area One State Restoration Account to restore, rehabilitate, replace, or acquire the equivalent of the injured natural resources at Butte Area One.

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<sup>1</sup> The State of Montana is a trustee of natural resources within the state. CERCLA Section 107 (f)(1), 42 U.S.C. ~ 9607(f)(1).

<sup>2</sup> As trustee, the State is entitled to "damages for injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing such injury, destruction, or loss resulting from" the release of a hazardous substance CERCLA Section 107(a)(4)(C), 42 U.S.C.~ 9607(a)(4)(C).

<sup>3</sup> "The term natural resources means land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by" the State. CERCLA Section 101(16), 42 U.S.C.~ 9601(16).

<sup>4</sup> "The terms respond or response means remove, removal, remedy, and remedial action." CERCLA Section 101(25), 42 U.S.C. ~ 9601 (25).

<sup>5</sup> "Area One" is an area in South-central Butte, which encompasses a contaminated alluvial aquifer and the confluence of Silver Bow and Blacktail Creeks.

In September of 2006, the United States Environmental Protection Agency (EPA) issued a Record of Decision<sup>6</sup> for the Butte Priority Soils Operable Unit (BPSOU).<sup>7</sup> A revision of the 1995 RDP for Butte Area One is now appropriate because the Record of Decision more definitely sets forth the expected nature and extent of EPA's response actions to be undertaken in this area than were previously estimated by the State in 1995. This added certainty regarding response actions now enables the State and the local community to craft restoration actions that not only mesh with EPA's remedy, but also, take into account the pending settlement with ARCO, including the amount of natural resource damages to be received by the State for restoration in the Butte area.

It should be emphasized that this is a conceptual restoration plan. It is not the State's intention that the potential restoration actions and alternatives described in this plan are set in stone. The State believes that, before adopting a final restoration plan for utilizing the \$28.0 million in settlement money earmarked for the Butte Area One Ground and Surface Water Resources, the community of Butte should have a say in the planning process and determination of appropriate restoration actions to be taken utilizing this amount. Accordingly, in Section 5 of this conceptual plan, the State suggests a restoration planning process that would involve the Butte community, with the understanding that the State's Governor, as Trustee, will continue to have the final say as to how the restoration dollars are to be spent.

### **1.1 Description of the Site and Sources of Hazardous Substances**

The deposition of wastes in the city of Butte from mining and mineral-processing operations has resulted in injury to groundwater resources and the surface water of Silver Bow Creek. The injured alluvial groundwater and surface water in Butte is located in the south central area of the BPSOU referred to as "Area One." Area One extends from the upper end of the Metro Storm Drain (MSD)<sup>8</sup> to the west to the east end of the former Colorado Tailings at the I-90 Bridge. Silver Bow Creek is formed by the confluence of Blacktail Creek and the Metro Storm Drain. Blacktail Creek flows year-round and comprises a large part of the flow of Silver Bow Creek.

Since the late 1800s, disposal practices from mining and mineral-processing operations in Butte have resulted in the presence of tailings and other mining-related wastes along parts of the Metro Storm Drain, Silver Bow Creek, and in the city of Butte. Much of the waste is associated with four facilities – the Parrot Smelter, the Butte Reduction Works, the Colorado Smelter, and the Berkeley Pit. The Parrot Tailings lie under and around the Butte city shop northeast of the Civic Center. Under order from EPA as part of the response action program,

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<sup>6</sup> EPA, September 2006. *Record of Decision, Butte Priority Soils Operable Unit Silver Bow Creek/Butte Area NPL Site*.

<sup>7</sup> The Butte Priority Soils Operable Unit, which is approximately 7 square miles, includes the town of Walkerville, the part of Butte north of Silver Bow Creek, including Area One and west of the Berkeley Pit, and an area that extends south from Silver Bow Creek to Timber Butte. See Figure 1.

<sup>8</sup> The watercourse known as the "Metro Storm Drain" generally follows the historic channel of Silver Bow Creek.

the Butte Reduction Works Tailings and the Colorado Tailings were mostly removed from the lower west Butte area in the 1990's. Highly contaminated tailings – laden water from the Berkeley Pit operation, which for many years was disposed of down the Metro Storm Drain, also played a role in contaminating Area One.

Surface water and streambed contamination results from the discharge of contaminated groundwater and from contaminated surface runoff. Alluvial groundwater discharges to Silver Bow Creek. Surface runoff from storms and snowmelt carries hazardous substances from dispersed waste sources in Butte to Silver Bow Creek through surface drainages and the Butte stormwater collection system.

## **1.2 Description of Injury**

### **Groundwater Injury at the Parrott Tailings Area:**

Injury to groundwater has been demonstrated by the occurrence of concentrations of heavy metals (including cadmium, zinc, iron, lead, and copper) arsenic, and sulfate that exceed drinking water standards in the alluvial aquifer in Butte. The areal extent of contamination of the alluvial aquifer is about a square mile and extends from the Parrott Tailings area at the Butte City-County shop downgradient towards Silver Bow Creek (See Figure 5). The highest concentrations of dissolved constituents in groundwater in the MSD area coincide with waste from the Parrott mill and smelter.<sup>9</sup> The Parrott smelter wastes have a volume of approximately 660,000 cubic yards.<sup>10</sup> The concentration of copper in wells completed within the Parrott Tailings area exceeds 900,000 parts per billion (ppb). Similarly, the concentration of zinc and cadmium in these wells exceeds 500,000 (ppb) and 2,000 (ppb) respectively.<sup>11</sup> These high concentrations are rivaled in the Upper Clark Fork River Basin only by the leach pad operations at the active mining site in Butte and often exceed concentrations found in the Berkeley Pit. The Parrott Tailings is located in the most upgradient parts of the Metro Storm Drain; there are other tailings areas along the MSD known as the "Diggings East," "Lower MSD" and the "Northside Tailings" areas. The volume of these tailings is about 115,000 cubic yards. Organic rich silts, clays, and/or peat, indicative of the marshy lowland setting along the Silver Bow Creek floodplain on which the tailings were placed, underlie the Parrot Tailings. Drilling and coring throughout the MSD drainage have demonstrated more limited amounts of tailings and other mine related wastes outside the Parrott Tailings area.<sup>12</sup>

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<sup>9</sup> *Summary of Investigation, Upper Silver Bow Creek, Butte Montana*, Montana Bureau of Mines and Geology, Open-File Report 507, 2004.

<sup>10</sup> *Focused Feasibility Study of the Metro Storm Drain*, CDM, February 2004.

<sup>11</sup> *Butte Priority Soils Operable Unit, Phase II Remedial Investigation*, Butte PSOU PRP Group, May 2001.

<sup>12</sup> Results are presented in a 2001 Montana Bureau of Mines and Geology (MBMG) report *Soils Borings, Tailings and Overburden Thickness and Volumes Lower Area One and Upper Metro Storm Drain*, James Madison, 8/2001.



In early 2004, Montana Bureau of Mines and Geology (MBMG), with funding provided by the EPA and the State, installed monitoring wells at four sites along the groundwater flow path between the Parrott Tailings area and the confluence of Blacktail and Silver Bow Creeks. The wells were drilled deeper than most others in the area; the objective was to fill data gaps about aquifer lithology and groundwater quality in the intermediate and deeper portions of the alluvial aquifer. Previous investigations focused on the upper 20 feet of the alluvial aquifer. This study found higher concentrations of dissolved constituents in the upper portions of the alluvial aquifer than shown in previous work. For example, zinc concentrations in three of the new wells, screened at a depth of 45 feet, was about 200,000 ppm. Concentrations of metals and sulfate in the 100-foot depth wells were considerably lower than water screened at 45 feet. Sampling of these wells again in 2006 confirmed these elevated concentrations.

The State's experts believe that data from the MBMG investigation demonstrates that: 1) contamination from the Parrott Tailings has migrated several thousand feet towards Silver Bow Creek; 2) the highest contamination occurs in an intermediate zone at 50 to 75 feet below the surface; 3) the intermediate groundwater zone is made up of discrete layers of gravel and sand with minor silt and clay; and 4) based on column tests using aquifer material from two contaminated areas, the recovery to drinking water standards for groundwater in the area could be reduced from thousands of years to less than 100 years if the Parrott Tailings are removed.<sup>13</sup>

### **1.3 Current Groundwater Injury at the Lower Area One:**

In the 1990s, under an order from EPA as part of the response action program, approximately 1.2 million cubic yards of tailings were removed from the lower portion of Area One ("Lower Area One") the Colorado Tailings and the Butte Reduction Works. This removal effort was an important step in the cleanup of the area and along all 22 miles of Silver Bow Creek.<sup>14</sup> Not all tailings were removed from this area however. MBMG estimates that approximately 55,000 cubic yards remain in this area at certain locations such as under the slag walls, and at the east end of the Butte Reduction Works (see Appendix 3).

Most of the wells used to monitor water quality in the Colorado tailings area were destroyed during the tailings removal; however, several new wells were installed in 1998. Data from these new wells show significant groundwater improvement in this area especially where most tailings were removed. However, most wells still have exceedences of one or more MCL (maximum contamination levels) and SMCL (secondary maximum contamination levels). Wells in the Butte Reduction Works, where removal of the tailings was incomplete, indicate that water quality also remains below drinking water standards.

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<sup>13</sup> Summary of Investigation, Upper Silver Bow Creek, Butte Montana. Montana Bureau of Mines and Geology, Open-File Report 507, 2004.

<sup>14</sup> MDEQ, in cooperation with EPA, is now in its eighth year of an estimated 12-year remedy/restoration cleanup of Silver Bow Creek.

#### 1.4 Current Injury to Silver Bow Creek Aquatic Resources:

The primary source of flow in Silver Bow Creek is inflow from Blacktail Creek. The MSD and Silver Bow Creek floodplain also receive storm runoff and snowmelt flow from the city of Butte, which is significantly contaminated. Over 420 acres on 218 wastes sites within the BPSOU area have undergone removal and/or capping remedies from 1988 through 2004 as the result of orders from EPA. Most of these sites are in the northern part of BPSOU. These actions have reduced the runoff loading of contamination in the BPSOU. However, the concentrations of hazardous substances in BPSOU storm water from the wastes sites are still above acute aquatic life standards. Storm water sampling along the MSD in 2001 and 2002 show aquatic life standard exceedences for copper and zinc occurring about 100 percent of the time. Concentrations at Silver Bow Creek sampling station SS-07 were as high as 200 times the total copper acute aquatic life standard levels and 30 times the zinc acute aquatic life standards. (See Appendix 2). Remedial actions under the EPA ROD are expected to significantly reduce these exceedences, especially with the slated upgrade of 40 miles of storm sewer lines.

In 2004, 45,000 cubic yards of soils, much was contaminated, were removed from the Metro Storm Drain Channel and a groundwater collection system was installed. This groundwater collection system is also expected to reduce the amount of contamination that historically has gone into Silver Bow Creek. Currently a 10-acre lagoon system is also being used to reduce metal concentrations from entering Silver Bow Creek. A liming facility is currently adding lime to the contaminated water collected in the area, which precipitates metals into the treatment lagoons. Remedial actions taken to date have improved base flow water quality in Silver Bow Creek; however, significant exceedences of water quality standard still occur, especially during storm runoff events. The further remedial actions to be taken are expected to significantly reduce these exceedences.

Currently the upper part of Silver Bow Creek contains elevated concentrations of dissolved cadmium, copper, manganese and zinc in surface water and stream sediments. This contamination is preventing or impairing optimal aquatic invertebrate and trout populations in the area. Substantial reductions of concentrations of these metals in surface water are needed to have a self-reproducing trout fishery in Silver Bow Creek. In addition, elevated arsenic and metals present in sediments in the reconstructed portion of Silver Bow Creek are moving downstream.<sup>15</sup> Based on the 2001 Baseline Ecological Risk Assessment, the 2004 BPSOU FS report<sup>16</sup> outlined the following conclusions that can be drawn regarding ecological risk at the BPSOU:

- Elevated concentrations of arsenic and metals are impacting surface water and sediments and sensitive receptors associated with these media. This is supported by predictive risk estimates and site-specific studies using macroinvertebrates and periphyton.

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<sup>15</sup> Environmental Protection Agency, 2001. *Final Baseline Ecological Risk Assessment Silver Bow Creek/Butte Area NPL Site Butte Priority Soils Operable Unit*.

<sup>16</sup> *Phase II Remedial Investigation/Feasibility Report*, Butte PRP group, April 2004.

- Dissolved cadmium, copper, zinc, and possibly manganese are the most important chemical stressors for aquatic biota throughout most of the site, as represented by salmonid fish, daphnids, benthic macroinvertebrates and periphyton.
- Arsenic, cadmium, copper, lead, and zinc in site sediments are the major chemical stressors for benthic invertebrates. These metals in sediment are also likely to contribute to the cumulative toxicity experienced by fish and other aquatic biota. Instream sediments also impair physical habitat, especially in depositional areas.
- Waterfowl may be at risk from consumption of water, sediment, aquatic vegetation, and aquatic invertebrates contaminated with arsenic, cadmium, copper, lead, or zinc.
- Greatly reduced concentrations of certain metals in surface water and sediment in Silver Bow Creek are needed to protect sensitive organisms inhabiting or using these media.
- Certain locations are consistently associated with the highest risk. These include locations in the MSD and Missoula Gulch (for both surface water and sediment) and surface water station at the downstream extent of the new channel at LAO. These areas can be a continuing source of contaminants to surface water and sediments for downstream reaches.
- Elevated metals are also present in sediments in the reconstructed portion of Silver Bow Creek. In general, sediments within the more upstream reaches of the reconstructed channel contain higher metals concentration compared to the sediments further downstream, and it appears that metals are moving downstream, probably as a function of flow. This movement is expected to increase seasonally or following major storm events. Sediment-based risks to aquatic biota are significant in and downstream of the MSD, Buffalo Gulch, Missoula Gulch, as well as in the upper reaches of Silver Bow Creek. In the future, significant sediment-based risks may occur in downstream reaches.

Section 2, below, describes the predicted residual injury to these aquatic resources once the EPA ROD is implemented.

## **Section 2: CERCLA Response Actions and Residual Injury**

### **2.1 EPA's September 2006 Record of Decision**

The following are among the actions that will be implemented, based on EPA's 2006 BPSOU Record of Decision. These remedial actions are expected to substantially reduce metal impacts to Silver Bow Creek.

- 1) Collecting contaminated groundwater throughout Lower Area One and routed to the existing treatment lagoons at Lower Area One for treatment on a probationary basis.

The five-year probationary period is deemed adequate to address operation and maintenance issues. A conventional lime treatment facility will be built if the open treatment lagoons prove inadequate in treating contaminated groundwater.

- 2) A storm water management program is planned to be implemented to prevent contaminated storm water runoff from harming surface water quality in Silver Bow Creek, Blacktail Creek, and Grove Gulch. Source controls such as routing of storm flows and maintaining covers on the 450 acres of previously reclaimed areas. Also, storm/sewer replacement of 40 miles of pipes is planned. If these controls are not effective in achieving adequate surface water quality in Silver Bow Creek, then storm water will be treated with lime to remove contaminants.
- 3) Approximately 1300 residential yards are planned to be replaced due to elevated lead levels over a 14 year period. All residential yards will be sampled.
- 4) Excavation of contaminated sediments from the stream bed, banks, and adjacent floodplain along Blacktail Creek and Silver Bow Creek, from just above the confluence of Blacktail Creek and MSD to the beginning of the reconstructed Silver Bow Creek floodplain at LAO.
- 5) Reclamation and enhancement of the Granite Mountain Memorial Area and Syndicate Pit area and monitoring of groundwater, surface water and previously reclaimed areas on Butte Hill. For ROD costing purposes all monitoring is planned for a 99 year period. However, remedial monitoring of the injured resources may be necessary indefinitely.
- 6) The Butte Reclamation Evaluation System will evaluate and maintain new and previously reclaimed sites over the long term.

A detailed summary of the ROD's remedy components can be found on pages D-6 to D-17 of the ROD. These pages are found in Appendix C of Appendix 2.

In addition to the above components, approximately \$60 million has already been spent on numerous response activities at the BPSOU, including:

- Removal of 1.2 million cubic yards of tailings and impacted soil from LAO during the 1990's. Silver Bow Creek was elevated, with the placement of 560,000 cubic yards of backfill, and relocated to facilitate control of groundwater and surface water within the area;
- Construction of engineered caps over contaminated mine waste at numerous locations on Butte Hill covering some 420 acres;
- Residential yard replacement at numerous locations on Butte Hill,
- Railroad bed removals in the city of Butte;

- Construction of storm water controls at numerous locations on Butte Hill;
- Excavation along the Metro Storm Drain channel in 2004 to install a groundwater collection system.

A summary of past actions can be found on pages D-3 through D-4 of the ROD, these pages can be found in Appendix C of Appendix 2 of this report.

## **2.2 Residual Groundwater and Surface Water Injuries**

Residual injury is the injury to natural resources that remains substantially unaddressed following implementation of the remedy. This concept is predicated on the fact that response actions can improve the condition of injured natural resources and thereby lessen natural resource injury. The selected remedy is not intended to and will not restore natural resources in Butte to baseline conditions.<sup>17</sup>

### **Upper and Lower Metro Storm Drain Groundwater Residual Injury:**

The Parrott Tailings will remain in the Upper Metro Storm Drain following remedial actions. These tailings will continue to release hazardous substances to groundwater in this area for many centuries, if not thousands of years. The Parrott Tailings is the most significant source of contamination to the alluvial aquifer in the MSD area, both because of its high leachable concentrations and because it is located a longer distance from downgradient surface water and, therefore, contaminates more groundwater than tailings located immediately upgradient of the MSD. Cleanup of the aquifer could be expedited by pumping the aquifer after tailings removal. This has been shown by column tests performed by the 2004 MBMG investigations. In the lower parts of the MSD there are about 115,000 cubic yards of tailings, which are also impacting groundwater in the area; these tailings are known as the Diggings East, Northside, and Lower MSD tailings.

### **Lower Area One Groundwater and Silver Bow Creek Aquatic Residual Injuries:**

Surface water resources in Lower Area One and the beginning of Silver Bow Creek have significantly improved since the removal of 1.2 million cubic yards of tailings in the 1990's. Aquatic life, such as macroinvertebrates and waterfowl use, has also significantly improved. However, there are hazardous substances remaining at LAO.

Groundwater contamination at LAO remains, although improvement in groundwater quality has occurred in area groundwater wells.<sup>18</sup> According to a 2005 investigation<sup>19</sup> by MBMG,

<sup>17</sup> DOI regulations define the term, "baseline," as the condition of the resource had the release of hazardous substances not occurred. (43C.F.R. ~11.14 (e)).

<sup>18</sup> See Figure 5 in Appendix 4, which compares the extent of groundwater injury in Area One in 1995 to 2001.

<sup>19</sup> *Soil Borings at Butte Silver Bow Metro Sewage Treatment Plant and Butte Reduction Works, Butte, Montana.* James Madison, Montana Bureau of Mines and Geology, January, 2006, 9 pages. Appendix 3 in this plan.

approximately 55,000 cubic yards of tailings remain under slagwalls and various other locations at LAO. No tailings were found under or around the wastewater treatment plant, as described in Appendix 3.

Sediment sampling, at Silver Bow Creek station SS-07, which is under the eastbound I-90 and I-15 underpass at the far west end of Lower Area One, has very elevated concentrations of cadmium, copper and zinc. This contamination is clearly coming from BPSOU sources such as the metro storm drain and Silver Bow Creek between Blacktail Creek and SS-07.<sup>20</sup> Concentrations from six sampling periods over two years (June 2002 to August, 2004) showed average fine grain sediment<sup>21</sup> cadmium, copper, and zinc concentrations of 26, 2,376, and 4,343 parts per million respectively. These concentrations are orders of magnitude higher than average samples found in nearby streams. It is expected that the EPA ROD will address these sediments, but it is unclear whether they will be addressed to the point of restoring the resources and eliminating all exceedences above baseline.

The elevated metals found in Silver Bow Creek sediments in Lower Area One are being released into the newly remediated and restored Silver Bow Creek. The MBMG Silver Bow Creek sediment sampling station a few miles downstream from Butte, SS-08 at Rocker, contained average fine grain sediment cadmium, copper and zinc concentrations of 19, 2,041 and 3,133 parts per million respectively during a 2002-2004 sampling period.<sup>22</sup> At this time it is not clear if the remedial actions planned in Butte will eliminate the elevated sediment contamination in the newly restored and remediated Silver Bow Creek.

#### **Waste Areas on Butte Hill:**

Remedial actions since 1988 included covering with soil about 420 acres of waste areas mostly in upper Butte. Some remediated waste areas on Butte Hill are in need of better quality and more quantity of soil cover and vegetation diversity in order to restore the natural resources at the site. Vegetative cover protects the cover soil from wind and water erosion by minimizing areas of bare ground, reducing surface water runoff velocity, and by increasing infiltration.<sup>23</sup>

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<sup>20</sup> *Post-Remediation Monitoring and Data Collection SSTOU Annual Report*, MBMG, February 2005.

<sup>21</sup> Average concentrations for the clay sediment fraction are presented. Concentrations for the silt, sand and composite samples are significantly lower. Clay fraction is significant to fish because benthic macroinvertebrates ingest fine-grained sediments during feeding, and through digestion can accumulate hazardous substances.

<sup>22</sup> In stream copper sediment concentrations of only 300 ppm and zinc concentrations of 260 ppm are known to have major impacts to benthic communities.

<sup>23</sup> From a MSU masters thesis by Cole Mayn, *Assessment of Land Reclamation Characteristics and Maintenance Techniques to Promote Long-Term Sustainability of Reclaimed Areas in Butte, Montana*. April 2001.

Runoff storm waters from Butte Hill are significantly elevated in metal concentrations.<sup>24</sup> The estimated volume of storm-water runoff from the 10-year, 24-hour storm event on the West-Side drainage area is approximately 21.6 million gallons and the runoff volume from the East-Side drainage area is about 16.5 million gallons. See drainage maps of these areas in Appendix 2. The estimated total volume of the 10-year, 24-hour storm water runoff from both the east and west side drainage areas is about 38 million gallons. If water quality standards are not met in Silver Bow Creek in the future then EPA's ROD calls for storm water treatment in order to meet water quality standards in Silver Bow Creek and other relevant waters. The costs for a remedial storm water treatment plant and annual O & M costs are estimated at \$47 million. Based on storm water quality over the last several decades it is possible that this storm water treatment plant will be necessary, however it is difficult to estimate the exact time frame when this decision may be made.

### **Section 3: Potential Restoration Actions**

There are two types of restoration actions presented in this conceptual restoration plan. Some actions are centered on direct restoration of resources by removing or mitigating wastes that are injuring groundwater and surface water resources. Other proposed actions addresses injuries at Area One with replacement projects. All restoration and replacement actions are outlined below and associated costs are presented in Table 1 and in Appendix 1.

#### **Potential Restoration Actions:**

The major components of the direct restoration actions by the Montana Natural Resource Damage Program (NRDP) proposed are:

- 1) Removal and reconstruction of the City-County vehicle shop, located east of the civic center and excavation of 666,000 cubic yards of the Parrot Tailings;
- 2) Excavate accessible tailings at Lower Area One and Lower Metro Storm Drain, estimated at 162,000 cubic yards;
- 3) Disposal of the excavated Area One wastes to a Butte area location such as the Butte Mine Waste Repository or possibly to Montana Resources or the Butte mine waste repository if access is obtained;
- 4) Placement of additional vegetative capping material on approximately 35 acres of previously reclaimed waste sites; and
- 5) Coordination with future remedial actions and enhanced restoration capping of 60 acres of unreclaimed waste areas.

Even though hazardous substances will remain in the BPSOU area, these restoration actions would expedite the recovery time for aquatic and groundwater resources at the site. A map

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<sup>24</sup> Appendix Two contains data summary sheets, which depict storm water metal exceedences from the Draft Data Summary and Interpretation Report, Base Flow and Wet Weather Data, ARCO. September 2005.

depicting the locations of the first three components is in Figure 2. See Appendix 2 for an overview of components 4 and 5 above.

### 3.1 Parrot Tailings Waste Removals:

Removal of the Parrott Tailings will necessitate the removal of the City-County Shop buildings because the thickest sections of the Parrott Tailings (up to 25 feet) are located there as described in EPA's 2004 Focused Feasibility Study (FFS).<sup>25</sup> Figure 3 depicts the City-County Shop Complex and the Parrott Tailings area, which would be subject to removal. The volume of tailings to be removed in the Parrott Tailings area is estimated at 666,000 cubic yards in Alternative 5b the FFS.<sup>26</sup> There may be more tailings and contaminated soils to the north of the City-County Shop, however, any contaminated groundwater from this area drain to the Berkeley Pit and not down the Metro Storm Drain to Silver Bow Creek.<sup>27</sup> The FFS evaluated three alternatives in the Parrott area for remediation of groundwater and surface water in Area One. Alternative 5b, which has similar components to this restoration proposal, calls for removal of 666,000 cubic yards of the Parrott Tailings and other work.<sup>28</sup>



Backfill may not be needed after the removal of the Parrott tailings since portions of the 37-acre area may serve as an excellent storm water detention basin or as a city park or both. It is anticipated that an estimated 62,000 cubic yards of backfill could be put back on the site and revegetated.

The present net value (PNV) cost for removal of the Parrot Tailings in 2010 and 2011 and placement of the tailings at the Butte Mine Waste Repository or another location in Butte, is estimated at \$19,962,820. This cost includes site demolition of the six shop buildings, and relocation and reconstruction of the

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<sup>25</sup> Focused Feasibility Study of the Metro Storm Drain, EPA, February 2004.

<sup>26</sup> There may be a need to sample some of the wastes to be removed for organic contamination. If significant organic contamination is found, this may increase the costs of removal, which should be covered by the contingency in the cost estimate.

<sup>27</sup> The dividing line between these two areas is known as the alluvial groundwater divide.

<sup>28</sup> Alternative 5b not only calls for removal of the shop buildings and 666,000 cubic yards of tailings, but also the removal of 113,800 cubic yards of tailings at Lower Area One and the construction of a water treatment plant and 100 years of O & M at the plant. This alternative had an estimated cost of \$73.6 million.



shop complex, which is about 45% of the total cost. The estimated cost also includes engineering and contingency of 15% each. A detailed breakdown of this cost estimate is provided in Appendix 1.<sup>29</sup>

### **3.2 Lower Metro Storm Drain and Lower Area One Waste Removals:**

Lower Metro Storm Drain waste is also proposed for removal. These wastes are known as 1) Northside Tailings, a 10-acre area; 2) Diggings East, a 19-acre area; and 3) Lower MSD, a 10-acre area. See Figure 4, taken from EPA's 2004 FFS report, which depicts these 3 contaminated areas. The volume of these tailings is estimated to be 113,800 cubic yards, according to EPA's FFS. Removal of these wastes is expected to enhance groundwater quality in the area.

At Lower Area One, additional tailings are proposed for removed as part of the restoration action. Approximately 47,700 cubic yards are proposed for removal and hauled by rail to the Butte Mine Waste Repository or another location in Butte. Of this amount, approximately 23,800 cubic yards of tailings are located under the slag walls. Removal of contaminated material under the slag walls may be difficult because of BSB's desire not to destroy these walls and because of their historic status. Care will be taken to keep the walls intact. Another 23,900 cubic yards of tailings are located at the east end of the former Butte Reduction Works. These tailings, called the BRW slag pile, are near the surface and are easily accessible. Figure One in Appendix 3, provides more details about the location of these wastes.

The estimated cost for removing the tailings from the Lower Metro Storm Drain and Lower Area One in 2009 with final disposal in Butte is \$6,033,021. A detailed cost estimate is included in Appendix 1. The cost estimate includes costs for loading, haul, unloading and spreading, revegetation, engineering and a contingency of 15%.

### **3.3 Butte Hill Waste Areas:**

There are 218 different waste areas on approximately 420 acres that have been reclaimed during the last two decades on Butte Hill and on other areas in Butte. Sixty-two sites, or less than one-third, are designated by BSB as open space. These areas are the best candidates for restoration since the open space status will ensure the caps will not be paved over or removed for infrastructure. The State's experts believe that approximately 35 acres of these open space capped areas need additional cover soil to insure a restoration vegetation cover.<sup>30</sup> Proposed under this restoration action is for these 35 acres to be capped with an additional 12 inches of soil to enhance vegetative cover and to potentially further reduce contaminated

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<sup>29</sup> This net present value estimate of cost assumes 3% inflation and a net 3% return on investment. The impact of rising energy costs may have to be considered at the time of construction. This cost may be lower if the tailings could be removed to a local repository.

<sup>30</sup> These 35 acres, which is about one-half of the area of the following sites that are proposed for additional capping/restoration are located within: Anselmo Dump, Anselmo Mineyard, Anselmo timberyard, Bonanza Dump and Shaft, NE Syndicate, Original Mineyard, Star West, Washoe Sampling Works, West Gagnon, Moscow Dump, NW Syndicate, Steward Mineyard, Syndicate Pit Dumps, and Upper Missoula Gulch.

runoff from these areas to SBC. These areas will also be fertilized and organic matter placed in the upper four inches of the cap. The areas will be seeded and vegetated with a mix of predominantly native species. Weed control and cap maintenance would be a component of this work.<sup>31</sup>

Also proposed is additional capping and restoration on 60 acres of uncapped areas in which remedial revegetation is slated to occur.<sup>32</sup> A report, which outlines this work, was prepared in May of 2005 by Rich Prodders of Bighorn Environmental Sciences. This report, which is in Appendix 2, is entitled *Area One Surface Water Resource Addendum Capping of Waste Source Sites*.<sup>33</sup> Map A-1 in the report depicts the areas proposed for restoration. This work will be done in coordination with EPA and its efforts under the ROD to remediate these areas. EPA's remedial capping efforts are ongoing under the ROD and some areas may be remediated prior to finalization of this plan.

The estimated PNW cost for capping the described areas in years 2009 and 2010 is \$4,012,256. This estimate includes costs for purchasing fill material from Butte-Silver Bow (from a fill site located near the city landfill) loading, hauling and placement of the fill material and organic matter, and revegetation of the capped area with native vegetation. A detailed break down of the cost estimate is provided in Appendix 1.

### **Potential Replacement Actions**

A number of replacement restoration actions are being proposed that consist of improvements to the Butte-Silver Bow water system. Jean Pentecost, former Butte-Silver Bow Public Works Department chief engineer, indicated that the following water system improvements projects are being considered by the Butte-Silver Bow Water Department. The projects are listed in order of priority:<sup>34</sup>

1. Replacement of the Diversion Dam at the Big Hole Pump Station;
2. Replacement of the impaired sections of the Big Hole 36-Inch Transmission Main;<sup>35</sup>

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<sup>31</sup> It is assumed that weed control costs will be covered by the contingency in the cost estimates.

<sup>32</sup> The contaminated waste sites that are proposed for revegetation in coordination with remedy are Lower Area One (30 acres), Grove Creek (5 acres), Clark Tailings (13 acres), Mountain Con 1-3 and Mineyard at the Granite Mountain Memorial Area (10 acres) and 2 acres along upper SBC.

<sup>33</sup> Mr. Prodders has 20 years of experience in mining reclamation, including working for BSB as a reclamation consultant on the Butte Hill wastes sites.

<sup>34</sup> The listed projects are not the only water projects that are vital for Butte's complex water system. For example the County is attempting to replace the 100-year old water distribution system in the city of Butte. Sections of the water main distribution system have been repaired with NRD funds over the past 6 years with almost \$9 million in grants. BSB estimates at least another \$15 million will be necessary to repair only 40% of the total system. Additional replacement is expected to be necessary for the entire system. BSB ratepayers have invested over \$47 million in the past decade to restore and replace its drinking water system. These investments were necessary, in part, because the local groundwater is significantly injured.

<sup>35</sup> An NRD grant application to replace 10,000 feet of the 100,000 foot Big Hole transmission line was submitted by BSB in 2007. Approval of this grant is expected before the end of this year.

3. Provide partial funding to construct a new water treatment plant for the Basin Creek surface water source.

A description of each project is provided below, and the estimated cost for each project is detailed in Appendix 1.<sup>36</sup>

### **3.4 Big Hole Diversion Dam Replacement:**

The existing Big Hole diversion dam was constructed in the early 1900's. There are records of improvements made to the dam in 1917, 1919, and 1927. The Big Hole dam is four-to-five feet in height and creates a pool that surcharges the intake piping for the existing pumping station. Improvements to the Big Hole pump station were made in 1994. The improvements included the installation of five 500-horsepower pumps with related piping and controls. The maximum capacity of the pump station is approximately 14 million gallons per day. Water is pumped through an existing 36-inch steel pipeline to the Big Hole Water Treatment Plant at Feeley. Problems with the existing dam and intake include the formation of "slush" ice in the winter, which clogs the intake structure. The dam itself is no longer structurally sound. Butte-Silver personnel have had to perform emergency repair work on more than one occasion to prevent the dam from failing (see photos below). The existing intake structure's concrete is in poor condition. Butte Silver Bow personnel have had to perform repairs on the structure to keep it intact. If the dam were to fail, Butte would lose its major source of drinking water until temporary pumping measures could be implemented and a new diversion dam constructed. The existing dam also poses a hazard to river floaters. The existing dam and diversion structure needs to be removed and a new concrete diversion dam and intake structure constructed in its place.

The cost to construct a new dam and intake structure is estimated to be about 1.6 million dollars. A detailed breakdown of the cost estimate for the dam is presented in Appendix 1. A contingency of 25% has been included in the cost estimate due to uncertain conditions at the dam site. An engineering analysis should be undertaken in order to verify existing geology and soils at the site and to evaluate flood flows and other conditions that will affect the final design and construction of the new diversion dam and intake. The design for the new diversion dam will have to take into consideration icing problems at the intake, safety considerations for recreational floaters, and environmental considerations.

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<sup>36</sup> The replacement restoration costs and other components of this plan were prepared with the assistance of Gary Swanson with Robert Peccia and Associates. Mr. Swanson has been an engineer for 25 years, with much of his career focused on Butte water projects.

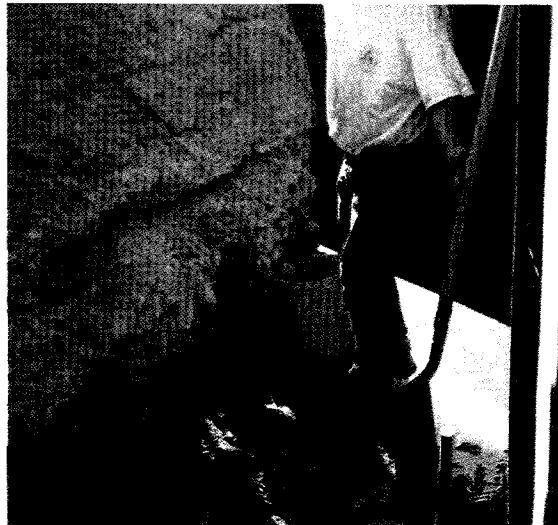
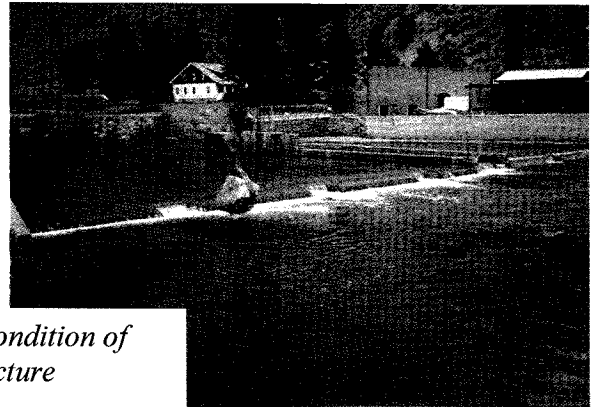
## Photos of Big Hole Diversion Dam



*Showing Installation of Rock Ballast to Repair Undercutting of Dam Structure*



*Showing Poor Condition of Dam Intake Structure Concrete*



### **3.5 Replacement or Rehabilitation of the 36-Inch 19-Mile Long Big Hole Transmission Main:**

The 36-inch 19-mile long Big Hole steel transmission main was constructed in the late 1960's and 1970's with steel pipe. The Butte Water System Master Plan prepared in 1988 by James Montgomery Consulting Engineers indicated that the capacity of the transmission main is 17.7 million gallons per day. The Master Plan also stated that at that time the leakage rate of the main was nine percent. Current indications are that the condition of the line is continuing to deteriorate (based on repairs performed by BSB personnel). If this main were to fail, Butte would lose its main source of water until repairs could be made. The typical useful life for a large diameter steel pipeline is 40 years according to *Water Resources and Environmental Engineering* (Linsley/Franzini 3<sup>rd</sup> Edition). Most of the existing pipeline is now about 40 years old. Since 1994, BSB has repaired 250 leaks to the pipeline, this equates to about 20 repairs per year. The average cost of each repair is \$2,000. Photos illustrating the condition of the transmission main have been included below.

**Photos of Leaks on Big Hole Pipeline**



The pipeline was coated with very substandard material which consisted of hand painting coal tar on the inside pipe with brushes. The outside of the pipeline was coated only in areas where the pipe was below groundwater. There is no corrosion protection or cathodic protection system installed on the pipeline to protect it from corrosive soils. For these and the above reasons sections of this pipeline needs to be rehabilitated.

The estimated average cost to rehabilitate one mile of pipeline is \$1.5 million including engineering and a 15% contingency.

It is not clear, at this point in time, how much of the pipeline will require rehabilitation or replacement. A corrosion evaluation should be performed on the pipeline to determine it's the overall condition. This study would entail the following steps:

1. Performing soil resistivity tests along the pipeline alignment to determine the corrosivity of the soils.
2. Excavate and expose the pipeline at locations where the resistivity testing indicates the most corrosive soil conditions.
3. Perform ultrasonic testing to verify the thickness of the pipe at the excavation sites. If necessary, circular samples of the pipeline (approximately 2-inches in diameter) would be cut out at various locations to provide visual verification of the pipeline condition. This sampling would occur in the fall or winter months when water demands are low and the pipeline can be taken out of service for a short period of time.
4. Install test stations at selected locations to determine if it is possible to install a corrosion protection system on the pipeline to protect and extend the useful life of the sections of pipeline that are still in serviceable condition.

The results of this study would provide data to determine what sections of pipeline need to be replaced and what sections that could remain in place if the appropriate protection is provided. The cost of performing the required study is estimated at \$35,000. This conceptual restoration plan in one of the restoration alternatives discussed below, is proposing to fund this study and one-half of the pipeline replacement and corrosion protection system once the required improvements are identified by the corrosion control study. The NRD funding can be used as a match if Butte-Silver Bow needs to acquire additional funding to complete any necessary Big Hole Pipeline improvements.

This replacement project may be eligible to receive grant funding from other sources such as the Montana Treasure State Endowment Program (TSEP), Renewable Resource Grant and Loan Program (RRGL), the State and Tribal Assistance Grant program (STAG) and the Water Resources Development Act (WRDA). Each of these sources is described briefly below:

TSEP. Up to \$750,000 in grant funding is available from the TSEP program, however, a 50% match is required from other sources. Matching funds can come from other grant and loan sources. Criteria for TSEP grant awards include urgent threats to health and safety, regulatory compliance, economic development and

financial need. Applications are competitive, and funding is available on a biannual basis, subject to legislative approval. Applications are typically due in May of even numbered years.

RRGL. Up to \$100,000 in grant funding is available from the RRGL program. Eligible projects must promote conservation of the water resource. Any governmental entity is eligible to apply.

STAG and WRDA Grants. Both of these programs require a congressional appropriation. The WRDA program is administered by the Army Corps of Engineers and the STAG program by the Environmental Protection Agency. Applications for these grant programs are available through the offices of each of Montana's congressional delegates. Typically the application is not specific to the SRDA versus the STAG program, and a funding request is assigned by the delegation to either program at its discretion. WRDA grants require a 45% match, none of which can be other federal dollars. STAG grants require a 25% match, which also cannot include other federal money. Municipal water projects are eligible under both grant programs. Strong local advocacy through repetitive and ongoing lobbying by local leaders and residents is important in obtaining WRDA or STAG funds.

### **3.6 Construction of a New Basin Creek Water Treatment Plant:**

Butte currently obtains up to seven million gallons of drinking water per day from the Basin Creek source. The Basin Creek source is currently under a filtration waiver and the only treatment it receives is chlorine disinfection. The Basin Creek source enters Butte's distribution system by gravity and is the community's most economical source of water. Upcoming EPA drinking water regulations for surface water sources will have an affect on the Basin Creek source. These regulations include:

**Long Term 1 Enhanced Surface Water Treatment Rule.** Unfiltered sources such as Basin Creek must update their watershed control programs to include cryptosporidium as a pathogen of concern. Cryptosporidium is a protozoan parasite that is resistant to disinfectants like chlorine and can cause acute gastrointestinal illness including the risk of death in sensitive subpopulations such as infants and the elderly.

**Long Term 2 Enhanced Surface Water Treatment Rule.** This Rule requires that all unfiltered systems provide at least 99 or 99.9 percent inactivation of cryptosporidium depending upon monitoring results for cryptosporidium in the water source. The purpose of this rule is to reduce disease incidence associated with cryptosporidium and other pathogenic organisms in drinking water. Unfiltered systems must meet the combined cryptosporidium, giardia lamblia, and virus inactivation requirements using a minimum of two disinfectants. Unfiltered systems not able to meet the required inactivation levels may be required to filter their water. Additionally, if the Basin Creek source fails to meet any of the requirements of its filtration waiver, Butte will have to construct a treatment plant. At a minimum, to

meet the requirements of this rule a second source of disinfection will have to be incorporated. A combination of ultraviolet light disinfection and chlorination may meet the requirements for two disinfectants.

Filtration waiver requirements include the following: source water turbidity measurements must stay below 5 NTU and total and fecal coliform concentrations must not exceed 20 per 100 milliliters and 100 per 100 milliliters, respectively. The Basin Creek watershed is heavily timbered and the forest is suffering from a pine beetle infestation that has killed a significant portion of the trees in the watershed. The watershed is currently very susceptible to fire. If a fire were to occur, the existing reservoirs would more than likely become contaminated with runoff with high loads of sediment and microbiological contaminants. Such an event would make very difficult if not impossible for the Basin Creek supply to meet the requirements of its filtration waiver. Therefore, there is a possibility that Butte will be required to construct a filtration plant for the Basin Creek source.

New regulations, such as those discussed above, and the susceptibility of the drainage to contamination from fire and other sources create the possibility that the county will not be able maintain the filtration waiver for Basin Creek in the long term and, perhaps, in the short term. Detailed cost estimates for the construction of a new water treatment plant utilizing membrane filtration, and for the construction of a combination ultraviolet/chlorine disinfection system, are provided in Appendix 1. The estimated total PNW cost for a new water treatment plant built in 2011 and 2012 is \$15.2 million, which includes engineering and a 20% contingency. The actual cost of the treatment plant will be dependent upon the final treatment technology that is selected.

It is difficult to predict when a new water treatment plant will be needed to treat the Basin Creek source. In some of the alternatives in this conceptual restoration plan below, the State proposes partial funding of the cost to construct a new water treatment plant for the Basin Creek source and/or install a second disinfection process to meet the requirements of the upcoming Long Term 2 Enhanced Surface Water Treatment Rule. These funds can be used to leverage other funding sources as described under Section 3.6 above.



### 3.7 Costs for Potential Restoration Actions

The present net value (PNV) cost for each of the restoration actions is summarized in Table 1 below:

<b>TABLE 1 SUMMARY OF POTENTIAL RESTORATION ACTIONS AND THEIR ESTIMATED COSTS</b>		
<b>Restoration Actions</b>	<b>Cost</b>	<b>Year(s) for work</b>
Parrot Tailings Removal, and City Shop reconstruction (PNV costs)	\$19,962,820	2010 & 2011
Lower Metro Storm Drain and Lower Area One Waste Removal	\$ 6,033,021	2009
Butte Waste Area Capping	\$ 4,012,256	2009 & 2010
Big Hole Diversion Dam Replacement	\$ 1,594,909	2009 & 2010
Replacement or rehabilitation of the Big Hole Pipeline	\$ 29,522,112	2010 & 2011
Basin Creek Water Treatment Plant	\$ 15,185,366	2011 & 2012

### Section Four: Potential Restoration Alternatives

The State's proposed restoration actions would build on the remedial actions that EPA is requiring. After remedial action, hazardous substances will remain at the Upper and Lower Metro Storm Drain area and at Lower Area One. The major goal for some of the proposed restoration alternatives is to enhance the recovery time of groundwater and aquatic resources to a baseline condition. There would be considerable benefit to Butte's municipal water system and its citizens if groundwater use in Area One were an option.<sup>37</sup> Presently Butte imports most of its water from surface water either from the untreated Basin Creek Reservoir or from the Big Hole River on the other side of the continental divide some 20 miles away.

Another goal of restoration can be replacement of some of the services that would have otherwise been available from the aquifer if it were not contaminated. DOI's Natural Resource Damage regulations allows the trustee during the damage determination phase to develop a number of possible alternatives that would restore, rehabilitate, replace, and/or acquire the equivalent of the injured resources. Proposed restoration actions can therefore include replacement of the groundwater and surface water services that would have been provided by the resources if the injuries had not occurred. Two of the three restoration alternatives outlined below, consist of actions, singly or in combination that would achieve those purposes.

In Section Five, below, the State proposes that a committee consisting primarily of Butte citizens/officials be formed to assist in further developing and selecting alternatives for

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<sup>37</sup> Duffield, John, *Revised Report and Rebuttal: Assessment of Damages to Groundwater and Literature Review of water Use Values in the Upper Clark Fork River Drainage*, October, 1995.

spending the settlement money earmarked for the Butte Area One.<sup>38</sup> Three potential restoration alternatives are presented here by the State. These alternatives are proposed as projects to be included in a Final Butte Area One Restoration Plan to be completed within one or two years of the effective date of the consent decrees, after input from the Butte committee and a public comment period.

#### **4.1 Alternative One:**

Alternative One would remove known primary waste sources to reduce releases of hazardous substances to ground and surface water. The major components for this alternative are:

- 1) Removal and reconstruction of the City-County vehicle shop, located east of the civic center;
- 2) Excavate and removal of an estimated 666,000 cubic yards at the Parrot Tailings;
- 3) Excavate and removal of accessible tailings at Lower Area One and Lower Metro Storm Drain, estimated at 162,000 cubic yards;
- 4) Placement of 12 inches of vegetative capping material on approximately 35 acres of previously reclaimed waste sites; and
- 5) Coordination with future remedial actions and enhanced restoration capping of 60 acres of unreclaimed waste areas.

The goals of Alternative One are primary restoration of the injured groundwater and alluvial aquifer, and restoration of Silver Bow Creek, within Butte, including its surface water.

Without removal of the Parrott tailings and other MSD and LAO wastes, the groundwater will not recover for several hundreds to thousands of years. The State believes that this alternative will reduce the time frame for recovery to 100 years or less and, therefore, greatly benefit the alluvial aquifer and injured groundwater resource.<sup>39</sup> It also believes that removals in Area One will also reduce the loading of hazardous substances into Silver Bow Creek and, therefore, protect the aquatic resources in and along the creek. The State is presently conducting a multi million-dollar remedial/restoration effort to remove hazardous substances from the creek. Reduction of metal loading from Area One sources will benefit this cleanup effort. The estimated total cost for the Area One source removals and replacement of the shop buildings is \$25,995,841. The proposed time frame for this work is between 2009 and 2011.

Placement of additional soil and seeding on the capped or future capped Butte waste areas will be coordinated with the remedial actions and would enhance the water quality of storm

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<sup>38</sup> It is estimated that several million dollars in interest earning will accrue from this \$28.0 million settlement amount while restoration is being planned, designed and performed.

<sup>39</sup> Installation of a pump and treat system in this area could further reduce the recovery time to about 30 years.

water before it reaches Silver Bow Creek. The enhanced capping effort will increase the total area of wastes capped with permanent vegetation covers, which will also reduce future remedial maintenance costs.<sup>40</sup> The cost for capping the proposed 95 acres at 21 separate waste sites is \$4,012,256. The proposed time frame for this action is during years 2009 and 2010, unless remedy occurs at these areas at a different time.

The Restoration work proposed above is expected greatly reduce the likelihood that a treatment plant will be necessary in perpetuity at the site, thereby saving many years of expensive treatment plant operation and maintenance. Total estimated PNV costs for Alternative One are estimated to be **\$30,008,097**.

#### **4.2 Alternative Two**

Alternative Two would remove known primary waste sources to reduce releases of hazardous substances to groundwater and surface water. The alternative also includes a replacement action, the construction of a water treatment plant for the Basin Creek drinking water supply. The major components for this alternative are:

- 1) Removal and reconstruction of the City-County vehicle shop, located east of the civic center;
- 2) Excavate and removal of 666,000 cubic yards of the Parrot Tailings;
- 3) Placement of 12 inches of vegetative capping material on approximately 35 acres of previously reclaimed waste sites;
- 4) Coordination with future remedial actions and enhanced restoration capping of 60 acres of unreclaimed waste areas;
- 5) Funding of one-third of the money needed for a water treatment plant for the Basin Creek Reservoir.

The goals of Alternative Two are three-fold; 1) primary restoration of the injured groundwater and alluvial aquifer; 2) restoration of Silver Bow Creek, within Butte, including its surface water; 3) enhancement of Butte's drinking water infrastructure.

Like Alternative One, this alternative reduces the impacts to surface water and groundwater with the removal of some of the major wastes source in Area One and by addressing some of the wastes piles on Butte Hill. Like Alternative One, this alternative will reduce the length of time remedy will have to treat contaminated water.

The replacement action chosen for Alternative Two focuses on the Basin Creek Reservoir drinking water source, which makes up 30 percent of Butte's supply. Construction of a water

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<sup>40</sup> The ROD calls for a water treatment plant for treating storm water if BMPs and existing treatment ponds are not effective in achieving surface water quality standards in Silver Bow Creek. The cost for this lime treatment plant is estimated at \$18 million.

treatment plant will be needed because the source is currently under a filtration waiver and the only treatment it receives is chlorine disinfection. Due to promulgated surface water treatment rules, and the susceptibility of the Basin Creek drainage to be contaminated, as explained in section 3.6, it is expected that the present filtration waiver will expire and a water treatment plant will be necessary.

The total PNV costs for Alternative Two are estimated to be **\$28,986,246**.

### **4.3 Alternative Three**

Under Alternative Three only replacement and waste capping actions are proposed. These actions are:

- 1) Replacement of 12 inches of vegetative capping material on approximately 35 acres of previously reclaimed waste sites;
- 2) Coordination with future remedial actions and enhanced restoration capping of 60 acres of unreclaimed waste areas;
- 3) Rehabilitate the Diversion Dam at the Big Hole Pump Station in 2009 and 2010;
- 4) Rehabilitate one-half of the Big Hole 36-Inch Transmission Main in 2010 and 2011; and
- 5) Funding of one-half of the money needed for a Basin Creek Reservoir water treatment plant.

In this alternative, no further action is taken to enhance the recovery of injured Area One ground and surface water resources beyond the work to be completed under remedy, with the exception of the capping work which should reduce contaminated runoff to Silver Bow Creek. Under this scenario it will take many centuries to thousands of years before the groundwater contamination would eventually decrease as leaching mechanisms deplete the supply of hazardous substances from the Parrott Tailings, MSD tailings, and LAO tailings. With the major contamination sources left in place, it will likely be necessary to leave the remedial water treatment operations for many centuries.

The above replacement actions are intended to replace the services that an uncontaminated alluvial aquifer could otherwise provide. The estimated PNV cost for the replacement and enhanced capping actions proposed under Alternative Three is estimated to be **\$27,960,903**. The time frame proposed for these actions is between 2009 and 2012.

## **Section Five: Restoration Planning Process for Butte Area One Groundwater and Surface Water Resources**

As noted above, the restoration alternatives discussed in this draft conceptual restoration plan are only recommended alternatives. Ultimately these projects may or may not be implemented. After the settlement is finally approved by the Court, a specific restoration

planning process will be developed to determine how the \$28 million in settlement money allocated to Butte Area One will be utilized to restore or replace the injured resources. This process will be formalized in a document which, in certain respects, would be similar to the planning process set forth in the State's Upper Clark Fork River Basin Restoration Plan Procedures and Criteria (RPPC), which the State utilizes in its restoration grant program. However, the goal of this new process would be different; the goal would be to develop a *final* restoration plan that would utilize the entire \$28 million, plus interest, on Butte restoration projects.

A "Butte NRD Restoration Council" would be created and, for purposes of Butte Area One restoration planning, take the place of the Governor's Advisory Council in the RPPC process. Other parts of that process, however, would be retained. For example, some of the criteria in the RPPC for selecting appropriate restoration projects would be retained, including the legal requirement that the settlement money be used only to restore, replace, or acquire the equivalent of the injured natural resources. Also, the Butte NRD Restoration Council would make its recommendation to the Governor's Trustee Restoration Council (consisting of the Directors of the State's natural resource agencies, the Attorney General, and the Governor's Chief of Staff) and then that council would make a recommendation to the Governor, who, as trustee of the settlement money, would approve the final restoration plan for the Butte Area One injured resources. (Referring to this as a "final" restoration plan is not meant to imply that additional NRD funded restoration projects that are outside the scope of this final plan could not be approved for the Butte area under the established RPPC restoration grant process.)

As indicated above, the major difference between the Butte and RPPC restoration planning processes would be that under the Butte planning process, there would be determination of a final restoration plan over a one to two year period and there would not be an on-going, annual restoration planning and grant process. (This is not to say that the Butte restoration plan could not subsequently be amended.) The final Butte restoration plan would allocate the entire \$28.0 million settlement amount earmarked for the Butte Area One injured resources, plus the interest earned on that amount, to specific restoration projects in the Butte area that would be thereafter implemented. This \$28.0 million will be held in an interest bearing, State special revenue account invested by the Montana Board of Investments. (For tax, trust and other legal and policy considerations, this requirement is mandated by the Consent Decree.)

The State envisions that the Butte NRD Restoration Council would be appointed by the Butte-Silver Bow Chief Executive, the Butte Silver Bow County Commissioners and the Governor. In order to facilitate an orderly and efficient planning process, the State believes that the Council should consist of approximately seven qualified Butte citizens or local officials appointed by the Chief Executive and approved by the Commission, and three qualified citizens or government officials appointed by the Governor, who would reflect more State-wide rather than local interests. The Butte Restoration Council will be staffed by Montana's NRD Program and one new staff member would be added to the Program and located in the Butte office. This new staff member's time would initially be devoted to the development of the Butte Restoration Plan and to servicing the Butte NRD Restoration

Council. It is expected that members of the Council will participate in the selection process for this new position. Once a Butte restoration plan was developed and approved by the Governor, this position would be responsible for overseeing the implementation of that plan, including design and construction oversight and ensuring the proper accounting of all expended restoration funds.

It is assumed that Butte Silver-Bow County would take the lead in implementing the Butte restoration plan pursuant to an MOU with the State providing for State oversight and funding from the \$28 million restoration fund held by the Board of Investments. Accordingly, the county would be responsible for procuring or hiring any needed employees, contractors and consultants needed to implement the plan and conduct the work. All costs of the development and implementation of the Butte restoration plan, including administrative costs, would come from the \$28 million, plus interest, earmarked for the Butte restoration.

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